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ABSTRACT

An attitude scale developed by Dutton, Petrie, and Adams was administered by classroom teachers to 850 pupils in grades 4-6 in 10 schools in one school system in September and again in May. The scale had two parts, a 15-item section assessing feelings toward mathematics and another part that asked the child to rank-order the subjects liked, best to least. In grade 4, mathematics was a liked subject in both testings. Pupils in grade 5 indicated a positive attitude toward mathematics, and it ranked in the top three subjects except in one school, with little change from beginning to end of the year. In grade 6, pupils for the most part ranked mathematics as a liked subject in September, but it was ranked lower in half the schools in May. Fear of word problems was cited at all three levels as a reason for disliking mathematics. Children liked mathematics because they considered it important and fun. (MNS)

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ASSESSING PUPIL ATTITUDES TOWARD MATHEMATICS

GRADES 4-6

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Assessing pupil attitudes toward mathematics is important; it has implications for curriculum development and achievement. It seems reasonable to believe the feelings children have toward mathematics will influence the amount of effort expended in working the problems. This effort appears to correlate with achievement scores. In 1951, Kurtz and Swenson found attitudes to be "more closely related to student's achievement scores than to their intelligence test scores." (7:56). Schminke, Maertens and Arnold report" more than anything else that a teacher does, a failure on his part to maintain positive attitude detracts from achievement." (6:19)

Can pupil attitudes toward mathematics be assessed? Actually attitude instruments can be constructed by classroom teachers and/or existing attitude inventories can be used. For this study, an attitude scale developed by Dutton, Petrie, and Adams was used. The scale, "A Study of Attitude Toward Mathematics," was administered by the classroom teacher in grades four-six. There were 850 children involved in the test. One school system, comprised of ten schools, was considered the population. The "Attitude Scale" was administered in September as a pre-test and again in May as a post-test during the same academic year. In Grade 4 the "Attitude Scale" was read to the pupils. This was done to avoid reading problems.

The "Attitude Scale" had two parts. Part I was a fifteen item test. The items assessed feelings toward mathematics. Each item had a scale value assigned by the developer. Table I indicates the value assigned to each test item in Part I.

Table I

Assigned Test Item Values

Test I	Scale Value
1.	7.2
2.	3.3
3.	8.7
4.	1.5
5.	10.5
6.	2.6
7.	7.9
8.	2.0
9.	9.6
10.	1.0
11.	8.2
12.	5.2
13.	9.5
14.	5.6
15.	9.0

Test items were ranked with values 1 - 10.5. Item 10 had the value of 1 and Item 5 had the value of 10.5.

Part II of the "Attitude Scale" asked the child to rank order the subject he liked, best to least. The academic subjects were placed in random order. The value of one was used for the subject liked best, two for the subject liked second best and nine for the subject liked least. Table II, III, IV rank order the mean scores for each grade assessed by school, A-J. Each subject area had a pre-test and post-test rank order score.

Upon completion of the instrument, Part II of the Scale was hand scored. The scoring was accomplished by assigning a scale value to each response. An average was computed for each child. The average computation was the summation of the total responses divided by the total number of responses. After the scoring, the scale values were charted. Table II assigns a scale value for grade four boys and girls.

Table II Subject Rank Order MEAN BY GRADE LEVEL, FOURTH

School	S.S. Pre-Post	Reading Pre-Post	Arithmetic Pre-Post	Music Pre-Post	Art Pre-Post	P.E. Pre-Post	English Pre-Post	Spelling Pre-Post	Science Pre-Post
A	7.39 8.39	5.07 4.7	2.32 4.2	5.67 6.70	3.57 4.0	1.54 1.74	6.85 1.94	3.0 3.59	6.08 7.08
B	5.70 7.19	4.44 4.26	2.10 2.93	3.98 7.85	3.25 2.54	3.29 2.5	7.53 8.10	7.96 3.77	3.21 7.86
C	7.64 7.80	5.15 4.46	4.65 3.62	6.97 5.46	3.43 4.68	1.30 2.26	8.04 7.36	5.04 6.15	5.77 5.33
D	8.40 6.73	3.48 4.36	3.63 4.45	3.45 4.35	5.42 5.79	2.89 3.75	8.42 5.92	4.55 6.12	5.79 3.5
E	4.20 7.82	5.59 5.31	1.80 2.24	7.50 8.42	7.04 7.14	2.08 2.08	7.88 8.19	7.37 5.07	5.54 4.47
F	8.29 8.33	8.29 7.17	3.63 3.4	1.42 2.35	1.60 1.88	1.72 2.16	7.75 8.22	7.21 7.50	7.31 8.05
G	8.12 7.68	7.53 5.17	4.91 2.40	7.89 7.91	2.54 2.70	1.36 1.72	7.57 8.33	4.38 3.14	5.50 7.0
H	7.11 6.90	4.00 6.25	3.52 3.83	4.87 3.94	7.54 6.48	1.44 1.65	7.72 2.31	5.57 5.27	5.96 7.13
I	6.26 7.39	5.75 5.12	2.72 3.	4.87 5.21	5.23 4.02	2.66 2.54	7.72 7.86	6.08 6.54	6.20 7.92
J	7.71 6.98	7.71 6.92	1.69 2.53	6.91 4.90	2.61 2.45	4.39 3.55	6.10 7.2	3.81 3.28	6.63 7.45

In Table II, Grade Four boys and girls indicated by rank order in the pre-test and post-test that mathematics was a liked subject. In most cases, rank order in the pre-test and post-test did not change. School A indicated a drop in attitude toward mathematics whereas School G indicated in the post-test a change to a more positive attitude toward mathematics.

Table III assigns a scale value for grade five boys and girls. An average was computed for each child.

Table III Subject Rank Order MEAN BY GRADE LEVEL, FIFTH

School	S.S. Pre-Post	Reading Pre-Post	Arithmetic Pre-Post	Music Pre-Post	Art Pre-Post	P.E. Pre-Post	English Pre-Post	Spelling Pre-Post	Science Pre-Post
A	6.53 6.73	4.44 6.75	3.70 2.47	7.45 7.0	4.72 4.0	1.49 1.41	8.41 8.15	6.28 4.91	5.74 8.11
B	5.70 2.68	4.44 5.5	2.10 3.94	3.98 8.28	3.25 4.0	3.29 2.52	7.53 8.25	7.96 6.69	3.21 4.43
C	6.89 6.87	5.39 6.87	3.80 4.06	7.93 7.36	4.71 3.9	1.74 4.34	6.68 7.0	4.06 3.97	5.26 6.77
D	7.55 5.0	5.42 5.42	3.67 3.04	3.16 2.68	6.86 6.62	1.91 3.98	7.92 8.53	3.80 2.94	3.80 3.87
E	8.32 6.50	3.67 3.74	1.98 2.28	8.22 7.94	8.43 4.33	1.95 1.95	8.35 7.92	5.73 7.33	4.91 7.6
F	6.82 7.0	8.00 7.44	4.28 3.81	5.73 1.67	3.00 2.24	2.50 4.14	8.38 8.65	4.17 2.67	4.14 6.75
G	8.19 7.28	6.18 4.4	2.53 3.37	8.32 7.47	2.79 2.67	1.94 1.71	8.04 7.19	3.68 3.28	6.06 7.71
H	5.64 5.97	6.30 5.34	3.35 2.44	6.50 8.24	7.47 7.09	1.34 2.26	7.87 6.05	3.41 3.68	3.79 6.27
I	6.26 3.74	5.77 5.81	2.72 3.28	4.87 6.69	5.23 5.79	2.66 3.86	7.72 5.37	6.08 7.19	6.20 5.55
J	8.68 8.21	6.47 5.65	2.46 2.38	7.38 6.33	1.52 3.12	2.57 2.25	6.68 7.81	3.79 3.31	7.19 5.81

In Table III, Grade Five boys and girls indicated they had a positive attitude toward mathematics. Mathematics ranked in the top three liked subjects except in one school. There appeared to be little change in attitude from the beginning of the academic year to the end of the year.

Table IV reports the summation of total responses on Part II of the Attitude Scale for Sixth Grade boys and girls.

Table IV Subject Rank Order MEAN BY GRADE LEVEL, SIXTH

School	S.S. Pre-Post	Reading Pre-Post	Arithmetic Pre-Post	Music Pre-Post	Art Pre-Post	P.E. Pre-Post	English Pre-Post	Spelling Pre-Post	Science Pre-Post
A	4.26 4.3	4.15 4.50	4.28 5.55	7.13 8.22	5.05 5.50	2.00 1.94	6.52 7.29	6.52 4.0	6.40 6.83
B	5.70 7.33	4.44 3.14	2.10 2.64	3.98 8.52	3.25 3.33	3.29 3.57	7.53 9.56	7.96 4.36	3.21 3.91
C	7.35 7.36	4.11 5.67	3.55 2.76	7.73 7.46	4.62 5.45	1.63 1.80	8.00 5.92	4.85 2.95	4.80 4.89
D	7.37 5.03	5.76 5.03	3.55 3.08	3.15 5.44	2.57 5.27	2.57 3.46	7.76 6.8	4.87 4.57	4.87 7.68
E	8.48 7.83	4.16 3.59	3.20 2.55	7.24 8.03	5.13 3.24	1.91 1.91	7.67 5.82	2.29 7.59	7.59 7.61
F	8.21 7.63	6.53 8.12	3.36 4.23	6.00 2.33	2.00 1.74	2.38 5.77	8.48 8.67	2.42 1.5	6.18 6.22
G	7.78 7.24	2.13 2.42	3.23 2.74	8.36 8.22	2.54 2.94	2.16 2.90	8.14 8.05	3.56 2.81	6.18 7.13
H	8.02 7.29	2.60 4.33	3.60 5.48	6.80 7.12	7.30 5.83	2.09 2.90	7.38 6.59	3.40 2.63	6.42 6.86
I	6.26 6.62	5.77 4.87	2.72 3.89	4.87 7.32	5.23 3.68	2.66 2.09	7.72 8.36	6.08 3.79	6.20 4.30
J	7.20 7.21	7.54 6.0	3.68 2.33	6.27 5.74	2.08 2.58	2.33 6.74	8.03 7.88	5.45 2.07	6.45 6.41

In Table IV Grade Six boys and girls, for the most part, ranked mathematics as a "liked" subject on the Pre-Test. However, by the end of the academic year the Post-Test showed the rank order of mathematics as a "best" liked subject had dropped in five of ten schools tested.

Table V compares the range of liked subjects to least liked subjects. The comparison covers grades Four through Six.

Table V

Range of Liked Subjects					
Grade 4		Grade 5		Grade 6	
Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
1.69-4.91	2.24-4.45	1.98-4.28	2.28-4.06	2.10-4.28	2.3-5.55

The pretest range from Grade to Grade indicated that children in grades Four through Six rank mathematics as a subject they like best. However, by the end of the academic year the rank order had changed. It can be noted that, in comparing the range of scores of liked subjects to least liked subjects, the range broadens at Grade Six.

Why do children like or dislike mathematics? In the 15 item test of Dutton, Petrie, and Adams, (Appendix I) children were asked to respond to each test item. Table VI shows the responses to each item by grade level and the total responses for the tested population.

Table VI
Grade 4
Responses by Schools of Likes and Dislikes

Statement	School 1	School 2	School 3	School 4	School 5	School 6	School 7	Total Response
1	49	86	55	54	82	36		362
2	21	52	36	44	49	27		229
3	45	76	52	50	87	33		343
4	5	33	14	18	14	5		89
5	25	54	35	30	69	23		236
6	6	37	12	14	21	12		102
7	25	58	45	47	58	20		253
8	22	36	14	32	36	14		154
9	37	60	48	65	61	20		291
10	3	23	7	13	14	5		65
11	43	73	53	44	74	32		384
12	7	37	20	17	9	12		102
13	43	66	45	50	82	27		313
14	40	65	50	45	63	29		292
15	42	71	60	65	81	35		354

Grade 4 children indicated they like Mathematics because:

Item 1 "They feel it is an important part of the school curriculum
Item 3 "It is fun"
Item 11 "They appreciate arithmetic for they understand"
Item 13 "It is challenging"
Item 15 "Gives satisfaction"

Table VII shows each school's scores for the totals of grades five. In addition it shows the total responses of all the schools tested.

Table VII

Grade 5								
Responses by Schools of Likes and Dislikes								
Statement	School 1	School 2	School 3	School 4	School 5	School 6	School 7	Total Response
1	53	85	49	65	57	32	50	391
2	16	40	28	39	39	25	30	217
3	56	76	42	57	58	33	52	374
4	17	16	9	10	13	5	4	74
5	38	35	35	33	34	21	34	230
6	17	13	6	9	12	5	6	68
7	46	69	35	35	33	27	44	289
8	6	39	22	17	19	12	21	136
9	51	53	39	49	45	28	37	302
10	0	13	3	2	8	2	4	32
11	50	75	47	57	42	35	43	349
12	2	16	8	8	16	13	5	68
13	43	58	38	51	43	26	44	303
14	49	64	47	46	41	16	40	303
15	47	83	49	63	44	7	53	346

Grade Five children indicated they liked Mathematics because:

Item 1 "They feel it is an important part of school curriculum"

Item 3 "It is fun"

Item 11 "They appreciate, for they understand"

Item 13 "It is challenging"

Item 14 "Gives satisfaction"

Table VIII records the pupils scores on the same 15 item test as is reported in Tables VI and VII. Each school is designated and the total responses of all the schools is compiled for Grade 6.

Table VIII

Grade 6 Responses by Schools of Likes and Dislikes								
Statement	School 1	School 2	School 3	School 4	School 5	School 6	School 7	Total Response
1	70	95	56	77	57		55	410
2	25	44	28	68	43		40	248
3	63	71	45	49	53		30	311
4	5	17	2	15	8		5	52
5	48	45	41	32	28		20	214
6	2	19	1	13	9		6	50
7	57	56	34	28	32		28	235
8	7	32	11	27	23		13	113
9	49	57	40	40	42		28	256
10	4	6	3	5	7		4	29
11	69	77	34	62	50		55	347
12	3	17	6	22	18		8	74
13	48	57	34	36	39		24	238
14	54	56	39	45	54		33	281
15	66	85	45	72	53		49	423

In Table VIII, Grade 6 children indicated they like mathematics because:

Item 1 "It is important part of the curriculum"

Item 3 "It is fun"

Item 11 "I appreciate arithmetic through understanding its values"

Item 15 "It gives me satisfaction"

It can be noted children in grades 4-6 in the schools tested liked mathematics for the same reasons.

Tables VI, VII, VIII reveal some of the dislike of boys and girls in grades 4-6.

Grade 4 dislikes included:

Item 6 "No satisfaction"

Item 8 "Afraid of word problems"

Grade 5 dislikes included:

Item 8 "Afraid of word problems"

Grade 6 dislikes included:

Item 8 "Afraid of word problems"

The one item of dislike that was consistent from grade 4-6 was item 8 - "Afraid of word problems."

It would seem that attitudes need to be assessed as a part of the diagnostic, prescriptive and preventative tasks of the teacher. These portions of teaching strategies must look for positive ways to build positive attitudes.

We know many of the reasons for negative attitudes toward mathematics as a subject in the curriculum. For example, this study supports Schminke, Maertens and Arnold's report of negative pupil attitudes toward mathematics:

1. "Insufficient time to complete assigned work.
2. Impatient and uninteresting teachers.
3. Genuine lack of understanding of mathematical principles.
4. Too many boring computative assignments.
5. Lack of application or required mathematics to real life situations.
6. Failure to experience success." (6:335)

However, it is felt that the results of this study place the emphasis where it belongs - on the positive attitude which children already possess:

1. "It is fun."
2. "It is challenging."
3. "It gives satisfaction."
4. "It is an important part of the school curriculum."
5. "They appreciate it."

As a further result of this study a "large" question is raised. Why do pupils lose some of their positive attitudes as they go from Fourth grade to Sixth grade? How can this decline in positive attitudes be prevented? "Food for much thought."

Bibliography

1. Troutman, Andrea P., and Betty K. Lichtenberg, Mathematics: A Good Beginning, Brooks/Cole Publishing Co., California, 1977.

2. Barton Hutchings, "Low Stress Algorithms", 1976 Yearbook, N.C.T.M., Reston, Virginia.

3. Marks, John L., C. Richard Purdy, Lucien B. Kinney, and Arthur A. Hiatt, Teaching Elementary School Mathematics for Understanding, McGraw-Hill Inc., New York, 1975.

4. Kramer, Klaas, Readings in Mathematics, Allyn and Bacon, Inc., Boston, 1970, p. 160.

5. N.C.T.M., Developing Computational Skills, 1978 Yearbook, Reston, Virginia.

6. Schminke, C.W., Maertens, Norbert and Arnold William, Teaching The Child Mathematics, Holt Rinehart and Winston, Chicago, 1978.

7. Swenson, Esther, Teaching Mathematics to Children, Macmillan, New York.

A. Place an X on the line below to indicate where you think your general feeling toward arithmetic might be.

11	10	9	8	7	6	5	4	3	2	1
Strongly favor				Not for or against						Strongly against

B. Check (X) only the statements which express your feeling toward arithmetic.

1.	I feel arithmetic is an important subject.	X
2.	Arithmetic is something you have to do even though it is not enjoyable.	X
3.	Working with numbers is fun.	X
4.	I have never liked arithmetic.	
5.	I like arithmetic better than any other subject.	
6.	I get no satisfaction from studying arithmetic.	
7.	I like arithmetic because step 2 follows step 1, etc.	
8.	I am unsuccessful at working word or story problems.	
9.	I like working all types of arithmetic problems.	X
10.	I dislike arithmetic and never use it outside of school.	
11.	I like arithmetic better than I did because I see how I can use it in every day life.	X
12.	I have no feelings toward arithmetic one way or another.	
13.	I have always liked arithmetic because it makes me think.	X
14.	I like arithmetic but I like other subjects just as well.	X
15.	Getting an answer and proving it in arithmetic makes me feel good.	X

C. 1. On the blanks following the subjects listed below, find the subject you like best and place a one (1) in that blank.

2. Find the subject you like least. Place a nine (9) in that blank.

3. Find the subject you like 2nd best and place a two (2) on that line.

4. Continue placing a different number on each line until you have used all the numbers between 1 and 9.

SOCIAL STUDIES	5
READING	1
ARITHMETIC	2
MUSIC	8
ART	6
P.E.	4
ENGLISH	7
SPELLING	3
SCIENCE	9

Statements 1-15 appeared in:
Kramer, Klaas, Readings in Mathematics,
Allyn and Bacon, Inc., Boston, 1970, p. 160.